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Sustainable Waste Management Practices for Urban Growth and Development in Uganda: a Case of Kamukuzi Division Mbarara Municipality

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Abstract

The study aimed at assessing the effect of sustainable waste management practices on urban development in Uganda, taking Kamukuzi division as a sample in Mbarara municipality and as a case study. Objectives of the study were; to identify sustainable waste management practices contributing to urban development, to establish the existing gaps between sustainable waste management practices and urban development and to explore measures to fill the existing gaps between sustainable waste management practices and urban development. A case study research design was used where both quantitative and qualitative methods of data collection and analysis were used. Case study enabled the researcher to study a single discrete social unit in depth. The study was based on a case study research design where different subjects were studied one point at a time. In this study, both the quantitative and qualitative approaches were used. The study population comprised employees from Kamukuzi division Mbarara municipality and community members with a total population of 6,459, a sample size consisted of 148 respondents where 50 respondents were used. Data analysis used two techniques namely qualitative and quantitative data analysis. It was found out that Solid waste management practices Communicate about coordination of primary and secondary collection systems, Separate waste inorganic materials, construction of drainage channels, Issuing of policies to communicate on proper waste management practices. Existing gaps between sustainable waste management and urban development included lack of attention at the planning and design stage, Insufficient incentives to implement waste reduction measures, poor sensitization of community members, poor strategic urban planning, corruption among officials, weak leadership, lack of strong government interaction, embezzlement of funds, Limited human resources and facilities. The study recommended that Outsourcing waste management services to private entities should demonstrate the importance of including social and livelihood aspects when considering full-scale privatization of waste management services.

Key Words: Sustainability, Waste management, urban growth and urban development

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Introduction

Globally, sustainable waste management includes reduction of waste at source, several collection services, diversion of waste from landfill through reuse, recycling and composting, and recovery of products and energy from residual waste materials. In countries like Canada, their governments play a key role in leadership in sustainable waste management. Such governments provide extensive input into the urban development of the 30-year sustainable waste management strategy, focusing on waste minimization and diversion of residential waste from landfill (Ai and Leigh, 2015).

In African countries, as urban development and growth continues to take place, the sustainable waste management is becoming a major public health and environmental concern in urban areas of many developing countries, (Allen and Potiowsky, 2008). For example in Nigeria, the concern is serious, particularly in the cities, which are often gateways to the countries for foreign diplomats, businessmen, and tourists. Poor visual appearance of these cities will have negative impacts on official and tourist visits and foreign investment. Recognizing its importance, a number of developing countries have requested collaboration of external support agencies, both bilateral and multilateral, in improving solid waste management in their cities in the last 20 years or so.

In Uganda, the practices of sustainable waste management lead to major social/environmental challenges (Douglas, 2008). For instance the main causes of the sustainable waste management problem are poverty, high population and urbanization growth rates compounded by a weak and underfunded infrastructure (Waswa et al., 2014). Urban growth and development leads to expansion of urban centers. The gravity of this problem is perhaps best reflected in the level of attention given to it in the United Nations Millennium Declaration in September, 2000. Three of the eight Millennium Development Goals (MDGs) outlined in the declaration have waste or resource efficiency implications (United Nations, 2007); ensure environmental sustainability by integrating the principles of sustainable waste management into country policies and programs and reverse the loss of environmental resources.

In Mbarara municipality, the sustainable waste management practices for municipality growth and development is through protection of human health and the environment, with conservation of valuable natural resources. An environmentally sustainable waste management system will help protect future generations from environmental degradation and associated financial burdens (Paul, 2011). Sustainable waste management is a critical issue for growing municipalities worldwide because: improper waste management can cause environmental and health problems, the decomposition of some wastes produces greenhouse gases, which contribute to climate change, and if not managed effectively, it can be costly to manage waste disposal sites for future generations thereby affecting the development of the area.

We argue in this article that absence of sustainable waste management in urban centers have been attributed to; - lack of enforcement plans to oblige waste producers to pay for waste management services especially households, the government is not properly equipped to manage waste, solid wastes have become recurring features in our urban environment which have contributed to under development of such centers and this has affected urban areas negatively. It is no longer in doubt that urban centers are inundated with the challenges of un-cleared solid wastes. Thus, urban residents are often confronted with the hazardous impact to their collective health, safety and economic development as well.

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Problem Statement

Sustainable waste management in urban areas is a vital strategy for development (Dayal, 2013). Sustainable waste management is seen through; - sensitization of residents on the dangers of poor solid waste management, provision of near-by solid waste collection points with segregation facilities to enhance easy collection and disposal of solid wastes from households, enactment of waste management laws with stiffer penalties on offenders to ensure compliance.

However with increasing urban populations, more waste is generated which strains existing capacity of local authorities to manage. Sustainable waste management is not a priority area among the urban poor dwellers, given that they have other urgent needs to address; such as handling security, health cases, poverty reduction projects. Poorly maintained equipment and inefficiencies in road design and urban settlement in informal settlements also impedes effective waste management. Additionally, lack of sufficient funds to finance awareness campaigns to encourage waste minimization at source along with minimal workforce impedes Mbarara municipality's efforts to achieve its vision. The government has tried to curb down challenges related to poor waste management by establishing waste recycling plants to reduce the quantity of wastes generated, effective monitoring of waste contractors to ensure that their performance is up to expectation but there is still a gap of inefficiency in sustainable waste management which has contributed to limited urban growth and development. This study intended to address the above situation through assessing sustainable waste management practices and urban development in Uganda, a case of Kamukuzi Division, Mbarara municipality.

Research Objectives

- i) To identify sustainable waste management practices contributing to urban development in Kamukuzi division Mbarara municipality.
- ii) To establish the existing gaps between sustainable waste management practices and urban development in Kamukuzi division Mbarara municipality.
- iii) To explore measures to fill the existing gaps between sustainable waste management practices and urban development in Kamukuzi division Mbarara municipality.

Theoretical Review

Theory of reasoned action (TRA) and theory planned behavior (TPB) were used in sustainable waste management practices program as a framework in understanding, explaining and predicting behavior. These theories are also useful as a guide for designing intervention strategies to maintain or change a particular behavior. The theory is based on the assumptions that individual behavioral intentions are directly associated with their attitudes. The theory of reasoned action views an individual's intention to perform or not to perform as an immediate determinant of the action. This behavioral intention has two determinants: attitude towards the behavior, and the subjective norms. The beliefs related on attitude towards the behavior are called behavioral beliefs whilst normative beliefs are for the subjective norms. The theory planned behavior views an individual's determination is influenced by attitude, social support and perceived behavioral control (Asmawatiand Fatimah, 2009).

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Sustainable Waste Management Practices Contributing to Urban Growth and Development

Barrett and Lawlor (2007) noted that sustainable waste management is all the activities and actions required to manage waste from its inception to its final disposal, this includes amongst other things, collection, transport, treatment and disposal of waste together with monitoring and regulation which contributes to urban development. It also encompasses the legal and regulatory framework that relates to waste management encompassing guidance on recycling etc. Industrialized nations are grappling with the problem of expeditious and safe waste disposal. Non-biodegradable and toxic wastes like radioactive remnants can potentially cause irreparable damage to environment and human health if not strategically disposed.

Preventing or reducing waste generation, extensive use of new or unnecessary products is the root cause of unchecked waste formation. The rapid population growth makes it imperative to use secondhand products or judiciously use the existing ones because if not, there is potential risk of people succumbing to the ill effects of toxic wastes. Disposing off the wastes will also assume formidable shape. Beede and Bloom (2015) noted that a conscious decision should be made at the personal and professional level to judiciously curb the menacing growth of wastes. Recycling, Recycling serves to transform the wastes into products of their own genre through industrial processing. Paper, glass, aluminum, and plastics are commonly recycled. It is environmental friendly to reuse the wastes instead of adding them to nature. However, processing technologies are pretty expensive.

Beigl, et al, (2008) argues that incineration features combustion of wastes to transform them into base components, with the generated heat being trapped for deriving energy. Assorted gases and inert ash are common by-products. Pollution is caused in varied degrees dependent on nature of waste combusted and incinerator design. Use of filters can check pollution. It is rather inexpensive to burn wastes and the waste volume is reduced by about 90%. The nutrient rich ash derived out of burning organic wastes can facilitate hydroponic solutions. Hazardous and toxic wastes can be easily be rid of by using this method. The energy extracted can be used for cooking, heating, and supplying power to turbines. However, strict vigilance and due diligence should be exercised to check the accidental leakage of micro level contaminants, such as dioxins from incinerator lines. Bekele (2007) states that composting which involves decomposition of organic wastes by microbes by allowing the waste to stay accumulated in a pit for a long period of time. The nutrient rich compost can be used as plant manure. However, the process is slow and consumes a significant amount of land. Biological reprocessing tremendously improves the fertility of soil.

Blakely and Leigh (2010) noted Sanitary Landfill as a sustainable waste management practice which involves the dumping of wastes into a landfill. The base is prepared of a protective lining, which serves as a barrier between wastes and ground water, and prevents the separation of toxic chemicals into the water zone. Waste layers are subjected to compaction and subsequently coated with an earth layer. Soil that is non-porous is preferred to mitigate the vulnerability of accidental leakage of toxic chemicals. He further says that Landfills should be created in places with low groundwater level and far from sources of flooding. However, sufficient number of skilled manpower is required to maintain sanitary landfills. Disposal in ocean/sea, Wastes generally of radioactive nature are dumped in the oceans far from active human habitats. Blakely and Leigh (2010) noted that environmentalists are challenging this method; as such an action is believed to spell doom for aquatic life by depriving the ocean waters of its inherent nutrients.

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In countries like Australia they are responsible generating more than 18 million tons of waste every year. It simply means that it produces approximately three million garbage trucks of compacted rubbish. As a matter of fact, the country is one of the highest waste producers in the world (Bogner and Matthews, 2013). These statistics may seem devastating, but the country strives to make some improvements to its waste management.

Local authorities are urging homeowners and business owners, especially industrial companies, to take action and be responsible for the waste problem. Efficient disposal is never easy, but that does not mean it is not achievable (Bower, 2007). As a trusted name in waste removal services, we thought we'd share effective methods of properly managing waste for development of their urban areas.

Breusch and Pagan (2010) noted that Segregation, glass, plastics, building materials and waste from site work could take many years to decompose. This is the reason waste separation using container units is necessary. As a leading provider of skip bins, we can help you with proper segregation so you can maintain green practices. Landfill is one of the most popularly used methods of waste disposal; Australians have a strong dependence on landfills. This process buries the waste in the land, but there is more to it. When it comes to proper landfill management, it is important to sort out the entire waste first and send only the waste that you cannot recycle or compost.

Bridgwater (2006) noted composting as a sustainable management practice which is the process that turns waste into organic compounds, which you can use to feed plants. Once you have identified and evaluated the waste, you can achieve composting through the use of skip bins. Though this method of waste disposal can take lots of space, you can turn unsafe organic products into safe compost. Recycling, Instead of disposing materials and other wastes, it could be better if your company practice recovery and recycling. This process aims to make unwanted items turn into useful ones. By knowing what you can recycle and how you can recover valuable resources, you can be a huge part of helping the country achieve a positive environmental future.

The Existing Gaps between Sustainable Waste Management Practices and Urban Growth and Development

Cailas, et al, (2013), noted that sustainable waste management has been a matter of concern for several decades; the main problem has been taking massive proportions due to growth in population and industrialization, the two major factors that contribute to waste generation. Though some advancement is being made in waste disposal methods, they are still not adequate. The challenge is to detect newer and un hazardous methods of waste disposal and put these methods to use.

A typical sustainable waste management system in a developing country displays an array of problems, including low collection coverage and irregular collection services, crude open dumping and burning without air and water pollution control, the breeding of flies and vermin, and the handling and control of informal waste picking or scavenging activities. According to Campbell and Feinstein (2013) public health, environmental, and management problems are caused by various factors which constrain the development of waste management practices. They can be categorized into technical, financial, institutional, economic, and social constraints.

Chang, et al, (2013) noted that technical constraints, in most developing countries, there typically is a lack of human resources at both the national and local levels with technical expertise necessary for sustainable waste management practices planning and operation.

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Many officers in charge of sustainable waste management practices, particularly at the local level, have little or no technical background or training in engineering or management. Without adequately trained personnel, a project initiated by external consultants could not be continued. Therefore, the development of human resources in the recipient country of external support is essential for the sustainability of the collaborative project.

Chen (2010) noted another technical constraint in developing countries is the lack of overall plans for sustainable waste management practices at the local and national levels. As a result, a waste management practice is often selected without due consideration to its appropriateness in the overall sustainable waste management practices. In some cases, foreign assistance is given to a component of a solid waste management practices for which the use of resources may not be most cost-effective. For instance, an external support agency provided its support to improve a general disposal site, Christiansen and Fischer (2009). However, the coverage of sustainable waste collection service is so low that waste generated is dumped at many undesignated sites. As a result, improving the disposal site, although it may not be a bad project, would have little impact on the overall sustainable waste management practices. In such a case, the low collection coverage is a bottleneck in the overall solid waste management system in the city, and it would be most cost-effective to provide resources to upgrade the collection service.

Research and development activities in sustainable waste management practices are often a low priority in developing countries. The lack of research and development activities in developing countries leads to the selection of inappropriate technology in terms of the local climatic and physical conditions, financial and human resource capabilities, and social or cultural acceptability. As a result, the technology selected can never be used, wasting the resources spent and making the project unsustainable. Coggins and Cooper (2012) argue that several guides/manuals on appropriate waste management practices in developing countries are available in the literature, and the selection of technology could be made sometimes based on these guides/manuals. However, in most cases, these guides/manuals must be modified to the local conditions prevailing in the country, and therefore local studies are normally still needed. Such studies can be relatively easily incorporated into a collaborative project and, to the extent possible, should involve local research institutions.

Costanza (2006) argues that several agencies at the national level are usually involved at least partially in solid waste management. However, there are often no clear roles/functions of the various national agencies defined in relation to solid waste management and also no single agency or committee designated to coordinate their projects and activities. The lack of coordination among the relevant agencies often results in different agencies becoming the national counterpart to different external support agencies for different solid waste management collaborative projects without being aware of what other national agencies are doing. This leads to duplication of efforts, wasting of resources, and un sustainability of overall solid waste management program.

The lack of effective legislation for sustainable waste management practices, which is a norm in most developing countries, is partially responsible for the roles/functions of the relevant national agencies not being clearly defined and the lack of coordination among them (Cutsinger, 2015). Legislation related to solid waste management in developing countries is usually fragmented, and several laws (Public Health Act, Local Government Act, Environmental Protection Act, etc.) include some clauses on rules/regulations regarding sustainable waste management practices. The rules and regulations are enforced by the different agencies. However, there are often duplication of responsibilities of the agencies

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involved and gaps/missing elements in the regulatory provisions for the development of effective sustainable waste management practices. It should be also noted that legislation is only effective if it is enforced.

Dayal (2013), Economic and industrial development play key roles in solid waste management, Obviously, an enhanced economy enables more funds to be allocated for sustainable waste management practices, providing a more sustainable financial basis. However, by definition, developing countries have weak economic bases and, hence, insufficient funds for sustainable development of solid waste management systems. Local industry which produces relatively inexpensive solid waste equipment and vehicles will reduce, or in some cases could eliminate totally, the need for importing expensive foreign equipment/vehicles and therefore foreign exchange. Such local industry can also supply associated spare parts, lack of which is often responsible for irregular and insufficient solid waste collection and disposal services. However, the lack of industry manufacturing solid waste equipment and spare parts and a limited foreign exchange for importing such equipment/spare parts are the rule rather than exception in developing countries.

Decker (2010), the social status of sustainable waste management practices workers is generally low in both developed and developing countries, but more so in developing countries than developed countries. This owes much to a negative perception of people regarding the work which involves the handling of waste or unwanted material. Such people's perception leads to the disrespect for the work and in turn produces low working ethics of laborers and poor quality of their work. Because of insufficient resources available in the government sector, collaborative projects often have attempted to mobilize community resources and develop community self-help activities. Results are a mixture of success and failures. Failed projects with inactive communities usually did not provide people in the community with economic as well as social incentives to participate in activities.

Dennison (2006) noted that the lack of public awareness and school education about the importance of proper sustainable waste management practices for health and well-being of people severely restricts the use of community-based approaches in developing countries. At dump sites, transfer stations, and street refuse bins, waste picking or scavenging activities are common scenes in developing countries. People involved have not received school education and vocational training to obtain knowledge and skills required for other jobs. They are also affected by limited employment opportunity available in the formal sector. Dwyer and Childs (2014) argues that the existence of waste pickers/scavengers creates often an obstacle to the operation of solid waste collection and disposal services. However, if organized properly, their activities can be effectively incorporated into a waste recycling system. Such an opportunistic approach is required for sustainable development of solid waste management programs in developing countries.

Measures to fill the Existing Gaps between Sustainable Waste Management Practices and Urban Growth and Development

A number of external support agencies recognize sustainable waste management practices as a priority issue in developing countries and are interested in supporting to improve the situation. However, their approaches to solving sustainable waste management practices and problems in developing countries have been piece-meal and not well coordinated. Also, their support has been provided mostly on a short-term basis. These characteristics of external support are inherent in the organizational mandates and operational modes of the external support agency, and therefore they cannot be easily changed (Emery, 2013).

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Ewing (2007) notes that what can be changed, however, are to combine support from different international aid agencies to make a collaborative project more comprehensive and long-term/continuous. This requires better coordination and communication among the external support agencies and development of partnership among them, removing the organizational egos and sharing and contributing their resources to the benefits of the recipient country. The collaborative project should be designed to improve the solid waste management situation gradually over a long period, instead of attempting a quick fix.

According to Flamingo (2009) for sustainable waste management practices in developing countries, human resource development should always be part of the external support package. Without local human resources, a collaborative project initiated by external support will not be able to continue. To develop human resources with technical expertise in solid waste management in developing countries, there are three strategically important groups for external support, namely key personnel in the national coordinating unit of the central government; operational managers of selected local governments; and university and other higher educational institutions. Among these target groups, the strengthening of human resources in the national coordinating unit and one or two selected local governments is the first priority and should be done in short term while support to higher educational institutions is a long-term programs. Fobil (2012) argues that it is the responsibility of the recipient country to select these potential target groups and improve their communication abilities. The donor countries should also improve their human resources in terms of their communication ability and knowledge of solid waste situation in developing countries.

Fujita (2008) noted that sustainable waste management practices and plans at both the national and local levels are essential for utilizing limited resources most effectively, and providing a frame of reference for potential external support. Therefore, the formulation of national and local strategic plans for solid waste management should be considered at the initial stage of the external support package. Realizing the importance of strategic planning, many external support agencies have supported or are beginning to support the preparation of overall national and local plans before providing equipment and facilities. However, the operation of such technical assistance is often separated from that of the provision of loans and grants for facilities and equipment. As a result, the follow-up action to the planning assistance is delayed or not given at all. Consequently, there are many plans produced, but they have not been implemented. For the sustainability of a solid waste collaborative project, it is crucial to provide external support to follow up on the implementation of the plan prepared. Here again, the approach of packaging external support can play a key role (Fujita, 2008).

Isard (2008) noted that private sector participation in sustainable waste management practices is also a way to reduce the financial burden of the government. It can draw not only investment finance from private companies for solid waste management equipment and facilities, but also managerial expertise and technical skills. Experiences in developing countries, which are reported elsewhere, indicate that privately operated services are generally more cost-effective than public sector services. Therefore, the use of private sector resources through a contractual arrangement provides a potential alternative towards self-financing solid waste management.

According to Jabareen (2006), effective application of economic incentive measures and private sector resources in sustainable waste management practices requires human resources to design and manage such schemes. Aside from human resources development in technical aspects of solid waste management, human resource development in financial

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planning and management is necessary and often a key to the development of more self-financing schemes.

Malizia and Feser (2009) noted that sustainable waste management practices involve the identification of problem areas in the local waste management setup with a view to proposing a series of alternatives that would provide a net economic, social and environmental benefit. Compromising any of these three pillars of sustainable development would imply the compromising of sustainable waste management initiatives. The proposals being put forward in this Plan will prove futile unless society commits itself to investing some of its time to secure better waste management practices. This requires a collective effort that will make Malta more sustainable in its waste management practices.

Research Methodology

Research Design

Research design refers to the overall strategy that you choose to integrate the different components of the study in a coherent and logical way, thereby, ensuring effective address of the research problem; it constitutes the blueprint for the collection, measurement, and analysis of data (Betensky, 2010). A case study research design was used where both quantitative and qualitative methods of data collection and analysis were applied. A case study research design enhanced the studying of a single discrete social unit in depth. The study was based on a case study research design where different subjects were studied at one point at a time. In this study, both the quantitative and qualitative methods were used though the quantitative approach was the one upon which the study was based. Qualitative methods were used to collect views and opinions of the community members which were presented in verbatim. This option was made because it is relatively convenient in expressing the peoples' opinions in a coherent manner. The design was selected because it is a method of investigation in which data was got from selected samples whose response representation respectively was given a clue to the view of the population. Secondary literature was also reviewed. This included textbooks, journals, articles and reports. This enhanced integration of findings with existing literature about the study problem. The design was good for the study because it generated quickly self-reports from the participants under study. Also this research design was chosen basing on its economy as it took less time and easy to generalize the population by using part of it by relying on panel data. Quantitative analysis of data collected through a questionnaire was done using Statistical Package for Social Scientists (SPSS).

Research Findings

Sustainable Waste Management Practices Contributing to Urban Growth and Development in Mbarara Municipality

Mbarara Municipal Council Waste Management Activities

The findings on activities done by municipal council in sustainable waste management in Table 4.4 indicated collection of wastes with 71(48.0%), further more prevention of waste generation 32(21.6%), 18(12.2%) indicated treatment and disposal of waste, 27(18.2%) suggested transport of waste to collection centers. This implies that the major activity of Mbarara municipal council is collection of waste to collection centers.

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Municipal Council Recycles Wastes

To get a clear view on whether Mbarara Municipal council recycles wastes respondent were asked and the majority of the respondents 60.9% agreed that municipal council recycles wastes, 22.9% of the respondents disagreed that Mbarara municipal council does not recycle wastes, 16.2% of the respondent were not sure.

Waste Management Practices

The study findings on waste management practices found out as revealed in Table 4.4 that the majority 20(13.5%) suggested communicating about coordination of primary and secondary collection systems, 22(14.9%) suggested developing waste management policies, 16(10.1%) revealed Separate waste inorganic materials, 15(10.1%) of the respondents suggested increasing social acceptability by incorporating participants, 12(8.1%) revealed combustion of waste, 11(7.4%) revealed issuing of policies to communicate on proper waste management, 9(6.1%) Regulating waste disposal and 8(5.4%) revealed provision of waste disposal bins.

It was learnt that there are different waste management practices in Mbarara municipality which contribute to sustainable waste management practices. These practices are practiced by both community members and municipal council employees. This is in support with one of the community members who reported that;

Once you have identified and evaluated the waste, you can achieve composting through the use of skip bins. Though this method of waste disposal can take lots of space, you can turn unsafe organic products into safe compost. Recycling, Instead of disposing materials and other wastes, it could be better if your company practice recovery and recycling. This process aims to make unwanted items turn into useful ones. By knowing what you can recycle and how you can recover valuable resources, you can be a huge part of helping the country achieve a positive environmental future” (community member in Kamukuzi, August 2017)

This implies that there are different waste management practices in Mbarara municipality which contribute to sustainable waste management practices. These practices are experienced by community members and employees.

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Table 4.4: Activities done by Mbarara Municipal Council in Sustainable Waste Management

Activities done	Frequency	Percent
Collection	71	48.0
Transport	27	18.2
Treatment of disposal of waste	18	12.2
Prevention of waste generation	32	21.6
Total	148	100
Municipal council recycles wastes		
Strongly disagree	19	12.8
Disagree	15	10.1
Agree	51	34.5
Strongly agree	39	26.4
Not sure	24	16.2
Total	148	100
Waste management practices		
Communicate about coordination of primary and secondary collection systems	20	13.5
Separate waste inorganic	18	12.2
Construction of drainage channels	17	11.5
Issuing of policies to communicate on proper waste management	11	7.4
Provision of waste disposal bins	8	5.4
Regulating waste disposal	9	6.1
Waste sorting which involves physical collection	16	10.8
Increasing social acceptability by incorporating participants	15	10.1
Developing waste management practices	22	14.9
Combustion of waste	12	8.1
Total	148	100

Source: Field Findings, 2017

The Existing Gaps between Sustainable Waste Management Practices and Urban Development in Mbarara Municipality

The following are existing gaps between sustainable waste management practices and urban development.

Poor and no government interventions undermines the sustainable waste management practices

The study findings on the existing gaps between sustainable waste management practices and urban development in Mbarara municipality, Results in Table 4.5 revealed the majority of the respondents agreeing that poor and no government interventions undermines the sustainable

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waste management practices where it has failed to improve and implement on the strategies of waste management revealed by 75%, 18.2% disagreed with the statement while 6.1% were not sure.

Crude open dumping and burning without air and water pollution control

The field findings on whether crude open dumping and burning without air pollution control is a gap for waste management practices and urban development, is that the majority 83.1% agreed with the statement, 11.5% disagreed with the statement, and the rest 4.7% were not sure, as indicated in Table 4.5. I further discovered that the population is not aware of the dangers of open dumping and burning of waste where there was unnecessary litters of polythene and plastics seen in Kiyanja, Kashanyarazi and Biafra areas in Kamukuzi division.

Low equipment for sustainable waste management practices limits effectiveness

Findings indicated that the majority of the respondents agreed that low equipment for sustainable waste management practices limits effectiveness 69.6%, 27.1% of the respondents disagreed with the statement, 3.4% of the respondents were not sure. As shown in Table 4.5. Furthermore I discovered that there were no litter bins provided in city centers and no collection points in town suburbs which remained a gap.

Poor urban planning is one of the major factors limiting sustainable waste management

Findings in Table 4.5 revealed that poor urban planning is one of the major factors limiting sustainable waste management and this was agreed by the majority 58.8% of the respondents, 37.1% disagreed with the statement, 4.1% were not sure whether urban planning is one of the major factors limiting sustainable waste management. From my perception I found out that the government doesn't always plan and cater for waste management in urban centers and therefore doesn't budget effectively for the dangers of poor waste disposal.

Limited effective legislation for sustainable waste management practices

Field findings in Table 4.5 revealed Lack of affective legislation for sustainable waste management practices as a gap for urban development was proven true and was agreed by the majority 68.9% of the respondents, 27% disagreed with the statement, while 4.1% of the respondents were not sure. And from my analysis the government has enacted laws to regulate waste disposal but they are not effectively implemented in Mbarara Municipality and therefore a gap that has failed urban development.

Limited human resource with effective experiences and knowledge of sustainable waste management practices

Findings on Lack of human resource with effective experience and knowledge of sustainable waste management practices showed majority 66.9% agreeing with the statement, 26.4% disagreed with the statement, and 6.8% were not sure, as indicated in Table 4.5.

Existing gaps between sustainable waste management and urban development

Field findings on other existing gaps between sustainable waste management and urban development as indicated in Table 4.5 revealed 25(16.9%) with embezzlement of funds, 23(15.5%) low sensitization of community members, 16(10.8%) Insufficient incentives to implement waste reduction measures, 11(7.4%) indicated Lack of strong government interaction and No attention to planning and design stages, 10(6.8%) indicated corruption

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among education officials, 9(6.1%) revealed poor strategic urban planning and lack of cooperate social responsibility, 8(5.4%) indicated lack of gazzetted dumping centers.

In an interview with a community member whose name was not revealed, on the existing gaps between sustainable waste management and urban development, he stated that;

There is problem of solid waste management; this weak financial basis of the municipality can be supplemented by the collection of user service charges. However, users' ability to pay for the services is very limited in poorer Mbarara municipality, and their willingness to pay for the services which are irregular and ineffective is not high either. An effective strategy for raising funds needs to be searched in any collaborative project to ensure its sustainability. At dump sites, transfer stations, and street refuse bins, waste picking or scavenging activities are common scenes in Mbarara municipality. People involved have not received school education and vocational training to obtain knowledge and skills required for other jobs (community member in Ruharo ward, August 2017).

This implies that the biggest challenge of sustainable waste management practices and urban development is Embezzlement of funds most especially in Kamukuzi division, Mbarara municipality.

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Table 4.5. The existing gaps between sustainable waste management practices and urban development in Mbarara municipality

Variable	Frequency	Percent
Poor and no government intervention undermines the sustainable waste management practices		
Strongly disagree	16	10.8
Disagree	11	7.4
Agree	51	34.5
strongly Agree	60	40.5
Not sure	9	6.1
Total	147	100.0
Crude open dumping and burning without air and pollution control		
Strongly disagree	42	28.4
Disagree	81	54.7
Agree	9	6.1
Strongly Agree	8	5.4
Not sure	7	4.7
Total	148	100.0
Low equipment for sustainable waste management practices limits effectiveness		
Strongly disagree	18	12.2
Disagree	22	14.9
Agree	51	34.5
Strongly agree	52	35.1
Not sure	5	3.4
Total	148	100
Poor urban planning is one of the major factors limiting sustainable waste management		
Strongly Disagree	28	18.9
Disagree	27	18.2
Agree	45	30.4
Strongly agree	42	28.4
Not sure	6	4.1
Total	148	100
Lack of effective legislation for sustainable waste management practices		
Strongly disagree	25	16.9
Disagree	15	10.1

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Agree	57	38.5
Strongly Agree	45	30.4
Not sure	6	4.1
Total	148	100
Lack of human resource with effective experiences and knowledge of sustainable waste management practices		
Strongly Disagree	17	11.5
Disagree	22	14.9
Agree	52	35.1
Strongly agree	47	31.8
Not sure	10	6.8
Total	148	100
Existing gaps between sustainable waste management and urban development		
Insufficient incentives to implement waste reduction measures	16	10.8
No attention in the planning and design stage	11	7.4
Sensitization of community members is low	23	15.5
poor strategic urban planning	9	6.1
lack of gazetted dumping centers	8	5.4
weak leadership	13	8.8
Lack of strong government interaction	11	7.4
Embezzlement of funds	25	16.9
Limited human resources and facilities	13	8.8
lack of cooperate social responsibility	9	6.1
Corruption among officials	10	6.8
Total	148	100

Source: Field findings, 2017

Measures to fill the existing gaps between sustainable waste management practices and urban development in Mbarara municipality

What is being done to fill the gaps between sustainable waste management and urban development?

The findings in Table 4.6 on measures to fill the existing gaps between sustainable waste management practices and urban development in Mbarara municipality found out that 47(31.7%) suggested laws and stiff penalties on offenders suggested, 39(26.3%) revealed sensitization of members, 22(14.8%) revealed provision of incinerators for conversion of solid waste into ash, 16(10.8%) suggested Effective monitoring of waste contractors to ensure their performance is exceptional, 14(9.4%) establishment of waste recycling plants, 10(6.7) revealed provision of nearby collection points.

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What NGOs should do to fill the gaps between sustainable waste management and urban development?

The study on What NGOs should do to fill the gaps between sustainable waste management and urban development found the following results in Table 4.6, 43(29.1%) of the respondents revealed Sensitization on dangers of poor waste disposal, 31(20.9%) revealed provision of waste treatment facilities, 29(19.6%) revealed Creating incentives to the private sector, 19(12.8%) revealed providing waste recycling plants.

In an interview with an NGO official in Mbarara Municipality revealed that;

NGO's should coordinate their activities with local authorities make recommendations on waste management proposals on waste disposal, this requires better coordination and communication among the external support agencies and development of partnership among them, removing the organizational egos and sharing and contributing their resources to the benefits of the recipient country. The collaborative project should be designed to improve the solid waste management situation gradually over a long period".(UNDP Representative in Booma Kamukuzi, August 2017).

This indicates that Non-government organizations are not doing their part in Sensitizing community members on dangers of poor waste disposal which is a major challenge.

What Mbarara municipal council should do to fill the gaps between sustainable waste management and urban development?

What Mbarara municipal council should do to fill the gaps between sustainable waste management and urban development revealed that it should implement waste management policies revealed by 43(29.1%), 39(26.4%) of the respondents revealed Sensitization of community on sustainability and urban development, 36(24.3%) regulation of poor waste disposal, 30(20.3%) Provide quality information about major waste components.

What Local leaders should do to fill the gaps between sustainable waste management and urban development?

The study on what Local leaders should do to fill the gaps between sustainable waste management and urban development revealed that; 55(37.2%) Participating in consultative meetings, 34(23.0) revealed Sensitizing community members on waste management, 23(15.5%) Participating in urban planning meetings, 19(12.8%) revealed Implementation of stiff laws and penalties, 17(11.5%) revealed Coordinate house to house hygiene.

Local leaders should play an important role in sustainable waste management through participating in consultative meetings, sensitizing community members on waste management this is in support with one of the local leaders in Ruharo ward whose name was not disclosed revealed that;

Realizing the importance of strategic planning, many external support agencies have supported or are beginning to support the preparation of overall national

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and local plans before providing equipment and facilities. However, the operation of such technical assistance is often separated from that of the provision of loans and grants for facilities and equipment. As a result, the follow-up action to the planning assistance is delayed or not given at all. Consequently, there are many plans produced, but they have not been implemented. For the sustainability of a solid waste collaborative project, it is crucial to provide external support to follow up on the implementation of the plan prepared” (A local leader in Ruharo ward, August 2017).

This implies that Local leaders should play an important role in sustainable waste management through participating in consultative meetings, sensitizing community members on waste management.

What community members should do to fill the gaps between sustainable waste management and urban development?

The study on what community members should do to fill the gaps between waste management and urban development, it was revealed by the majority 36(24.3%) that Adhering to laws concerning sustainable waste management, 34(23.0%) Coordinate proper waste management, 32(21.6%) effective and collective participation can be done by community members, 25(16.9%) revealed Campaigning to resist unwanted waste disposal and 21(14.2%) Sensitization of the masses on proper waste management

One of the community members on the role of community members on sustainable waste and urban development revealed that;

There are three strategically important groups for external support, namely key personnel in the national coordinating unit of Mbarara municipality; operational managers of Mbarara municipality; and university and other higher educational institutions. Among these target groups, the strengthening of human resources in the national coordinating unit and one or two selected local governments is the first priority and should be done in short term while support to higher educational institutions is a long-term programs”.(A community member in Kacheeka, August 2017).

This indicated that community members play a big role on sustainable waste management and urban development by cooperating with stakeholders, employees, natural resource officials and environment officers.

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Table 4.6: Gap between sustainable waste management and urban development?

What is being done	Frequency	Percent
Sensitization of members	39	26.3
Provision of nearby collection points	10	6.7
laws and stiff penalties on offenders	47	31.7
Establishment of waste recycling plants	14	9.4
Effective monitoring of waste contractors to ensure their performance is exceptional	16	10.8
Provision of incinerators for conversion of solid waste into ash	22	14.8
Total	148	100
What NGOs should do		
Creating incentives to the private sector	29	19.6
Provide incinerators	26	17.6
Provide waste recycling plants	19	12.8
Sensitization on dangers of poor waste disposal	43	29.1
Provision of waste treatment facilities	31	20.9
Total	148	100
What Mbarara municipal council should do		
Implementation of waste management policies	43	29.1
Regulation of poor waste disposal	36	24.3
Provide quality information about major waste components	30	20.3
Sensitization of community on sustainability and urban development	39	26.4
Total	148	100
What Local leaders should do		
Participate in consultative meetings	55	37.2
Participate in urban planning meetings	23	15.5
Sensitizing community members on waste management	34	23.0
Implementation of stiff laws and penalties	19	12.8
Coordinate house to house hygiene	17	11.5
Total	148	100
What community members should do		
Adhering to laws concerning sustainable waste management	36	24.3
Campaign to resist unwanted waste disposal	25	16.9
Coordinate proper waste management	34	23.0
Effective and collective participation	32	21.6
Sensitization of the masses on proper waste management	21	14.2
Total	148	100

Source: Field findings, 2017

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What the government should do to fill the gap between sustainable waste management and urban development.

Field study findings on what the government should do to fill the gap between sustainable waste management and urban development in figure 5 revealed that the majority of the respondents 29% suggested Fighting corruption among her officials, 10% suggested both Provide nearby collection points, 12% revealed issuing strong sustainable waste management policies, 12% revealed Technological support to transform waste management and urban development, 13% revealed Creating financial incentives to provide market, 13% revealed Fostering communication and cooperation among stakeholders.

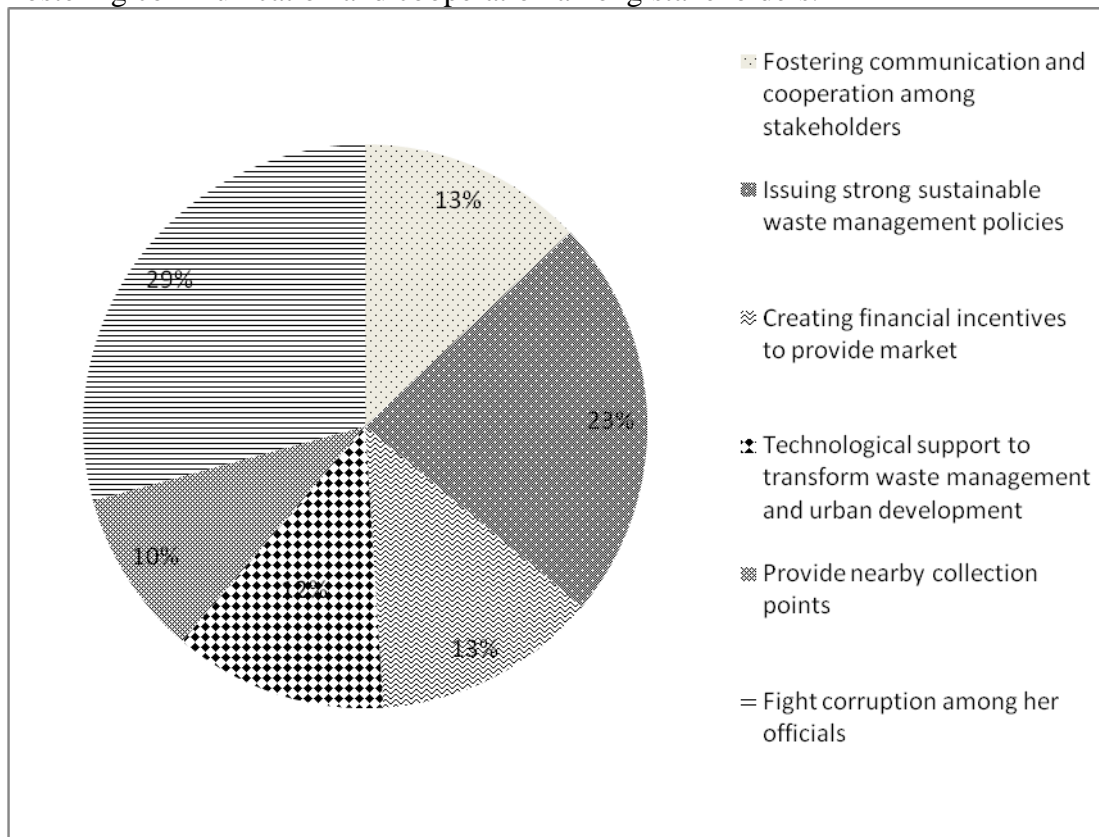


Figure 5: A pie chart showing what the government should do to fill the gaps between sustainable waste management and urban development

Source: Field findings, 2017.

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Discussion of the Findings

Sustainable Waste Management Practices Contributing to Urban Development in Mbarara Municipality

The study findings revealed that the major community contribution on solid waste management is to strategically plan waste minimization and green procurement this was agreed that strategically planned waste minimization and green procurement programs leading to more sustainable consumption patterns along with economic development. The multiple bounded discrete choice (MBDC) value elicitation method is employed in this study. Compared to the traditional single and double bounded dichotomous choice (DC) method, the MBDC format combines two aspects of value elicitation format development. On one hand, the MBDC format allows each respondent to vote repeatedly on an ordered sequence of referendum thresholds, and therefore reduces the impact of the anchoring heuristic (Tversky and Kahneman, 1974) which often presents in single or double bounded questions. The repeated referendum thresholds can provide more data to verify the coherence and credibility of the valuation results. On the other hand, in MBDC format, for each referendum threshold, a scale of polychotomous choice response options varying from Definitely No, Probably Yes, Not Sure, and Probably No to Definitely Yes is also provided. The polychotomous choices provide the possibility to detect and treat the potential significant uncertainties presented in each response and therefore guaranties more reliable estimations.

The study findings revealed that waste management focuses largely on waste collection. Conventional waste management focuses largely on waste collection, treatment (composting and incineration) and disposal (landfills). Only limited attempts are made to adopt integrated waste management practices that involve waste reduction at the source, resource recovery and recycling. The resource value of waste cannot be realized unless separation of wastes is practiced effectively at the source. From the social perspective, developing countries can benefit from viewing the environmental technology industry as a potential source of employment or "green jobs" and long-term asset protection. The number of people involved in waste management in both formal and informal sectors is a significant number. Providing a better occupational environment and protective measures, and by formalizing the informal sector workers, cities can contribute in a meaningful way to raising the living standards of its citizens. Improved resource efficiency could also lessen potential pressures and avoid root causes of social conflicts that could arise from resource competition.

The study findings revealed that facilitating recycling valuable resources such as plastic, glass, paper and metals, recovery of alternate is vital in waste management, The repeated referendum thresholds can provide more data to verify the coherence and credibility of the valuation results. On the other hand, in MBDC format, for each referendum threshold, a scale of polychotomous choice response options varying from Definitely No, Probably Yes, Not Sure, Probably No to Definitely yes is also provided. The polychotomous choices provide the possibility to detect and treat the potential significant uncertainties presented in each response and therefore guaranties more reliable estimations. However, the MBDC format is thought to require more cares in implementation, and confidence in successfully implementing a MBDC CV survey has not been built up, and as of now not many MBDC studies have been conducted. This study is one of the few MBDC studies conducted so far.

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The Existing Gaps between Sustainable Waste Management Practices and Urban Development in Mbarara Municipality

The study findings showed that there is a challenge of waste accumulation. Problems of waste accumulation have become a serious threat to the health situation of many of its inhabitants. Overall, mechanisms of conventional approaches have been failing to address urban challenges (World Bank 1986, in Halla 1999:94 World Bank 2001:13). According to B.K Majani, (2000), the failure of the conventional approaches has resulted into a set of complex environmental problems that require more effective approaches to address. The conventional approaches have failed to address problems due to their serious conceptual and practical weaknesses, Halla, (1994).

The study findings revealed Lack of an adequate policy and regulatory frame work is a challenge to sustainable waste management this was also revealed that the lack of an adequate policy and regulatory framework complicates matters even further. Experience has shown that the command and control approach alone cannot and will not improve waste management practices. Command and control should be supplemented by market based instruments with incentives and disincentives so as to stimulate investments and entrepreneurship to transform waste management into an environmentally sound and socially acceptable business.

Lack of regulations on certain waste streams, this was in agreement with Bluffstone and Deshazo (2003). No attention given to other newer waste streams for special handling as well as recovering resources. Several studies, especially those conducted in the developing countries, also reveal an important phenomenon that although people rank improper solid waste disposal as the top environmental problem, the user fee that they are willing to pay can only partially cover the cost of the service. Bluffstone and Deshazo (2003) concluded that the WTP for upgraded landfills covers only about 80-90% of the cost for a project in Lithuania to upgrade their SWM system to European level. Naz and Naz (2005) found the ratio of WTP over the total cost to be only 22-35% in the Philippines. Palatnik et al. (2006) also mentioned the necessity of subsidy to achieve an efficient level of recycling for the case of Israel.

Measures to fill the existing gaps between sustainable waste management practices and urban development in Mbarara municipality

The study found out that establishing and improving facilities for collection can manage waste. Establishing and improving facilities for collection, recycling, treatment and disposal for MSW management can be very costly. For example, building and operating sanitary landfills and incineration plants require huge investments and incur substantial operation and maintenance costs.

Urban planning and management is another way of how solid waste management service should be improved and sustained. For centuries, efforts to address the urban planning and management have been guided by conventional approaches (Armstrong, 1987, Mattingly 1988; Halla, 1999, Majani, 2002). In developed countries mechanisms of conventional approaches have successfully tackled these challenges and many evidences of such successes are remarkable in the United States of America, the United Kingdom, Germany and the rest of Europe (Halla, 1999, 2002). The same approaches have been used to tackle similar challenges in the developing countries including Uganda with very little success not able to provide significant solutions to major problems including solid waste management.

Recycling plastic materials, urban managers are therefore encouraged to pursue the paths of Integrated Solid Waste Management (ISWM) and Reduce, Reuse and Recycle (3Rs) that place highest priority on waste prevention, waste reduction, and waste recycling instead of

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just trying to cope with ever-increasing amounts of waste through treatment and disposal. Such efforts will help cities to reduce the financial burden on city authorities for waste management, as well as reduce the pressure on landfill requirements.

Conclusion

The study findings revealed that Solid waste management practices Communicate about coordination of primary and secondary collection systems, Separate waste inorganic materials, construction of drainage channels, Issuing of policies to communicate on proper waste management, Regulating waste disposal, Combustion of waste, Waste sorting which involves physical collection, increasing social acceptability by incorporating participants, Developing waste management practices and Provision of waste disposal bins.

Existing gaps between sustainable waste management and urban development; No attention and the planning and design stage, Insufficient incentives to implement waste reduction measures, sensitization of community members is low, poor strategic urban planning, corruption among officials, weak leadership, lack of strong government interaction, embezzlement of funds, Limited human resources and facilities, lack of cooperate social responsibility and lack of gazetted dumping centers.

What is being done to fill the gap between sustainable waste management and urban development include; sensitization of members, Provision of nearby collection points, laws and stiff penalties on offenders, Establishment of waste recycling plants, effective monitoring of waste contractors to ensure their performance is exceptional, Provision of incinerators for conversion of solid waste into ash, Fostering communication and cooperation among stakeholders, Issuing strong sustainable waste management policies, Creating financial incentives to provide market, Technological support to transform waste management and urban development, Provide nearby collection points, Fight corruption among her officials, Creating incentives to the private sector, Provide incinerators, Provide waste recycling plants, Sensitization on dangers of poor waste disposal, Provision of waste treatment facilities, Implementation of waste management policies, Sensitization of community on sustainability and urban development, Provide quality information about major waste components.

Recommendations

Outsourcing waste management services to private entities in should demonstrates the importance of including social and livelihood aspects when considering full-scale privatization of waste management services. The terms of contracts offered by the city authorities should ensure equal opportunity for recycling cooperatives to bid along with private entities, particularly in services such as collection and recycling where the recycling cooperatives have rich experience.

There is no standard methodology for analyzing the extent to which CBOs play a role in delivering effective solid waste management, for this remains a relatively new development. The future of solid waste management depends on the quality of the co-operation of the local government with NGOs and CBOs and citizens themselves. It has been shown that CBOs in solid waste management ought to be an essential component of new developments in this area. The future of municipal waste management depends not only on the effectiveness of local government, the operator of public services, but also on the attitude of citizens, and on the key role of CBOs to shape and develop community participation, as the reality of formal waste management.

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In order to have positive participation the CBO should facilitate campaigns and workshops/seminars for sensitizing and raising the awareness of the community in solid waste management issues. The provided knowledge should include not just the financial obligation of the households but also other benefits of the service. Education is the major solution to problems of low participation of households, which comprises issues such as low community priority for solid waste management, low willingness to participate in collection systems and in keeping public spaces clean, and low willingness to pay. Also benefits and practice of separation of wet and dry waste at source and schedule of collection should be observed. Creating of this awareness must not only be included at the outset of a project, but should be carried on throughout. In this regard there is a need for having strong leadership.

Sustainable willingness to pay and payment in relation to achievement will increase willingness to pay because households will receive an observable benefit. Willingness to pay has to be studied beforehand to conceive acceptable ways of payment that are financially affordable by the households. Due to the fact that not all service fees charged are affordable there is a need of introducing different fees and different collection systems for different generators of waste. Households in the unplanned area should pay a low fee and send their garbage to communal bins, which are simple to empty to the waste collection vans. Clinics, restaurants and hotels, etc. should be charged a higher cost that covers fee for door-to-door collection. Fees should be based on the amount of garbage-produced and or on the income level of the household.

One-way is the provision of facilities (equipment, collection sites, etc.); others are the establishment of legislation, financial assistance, and promotion. The council has to play a highly positive role in stimulating community-based solid waste management. The council can, for example, stimulate a neighborhood sorting and recycling plant by doubling the sales of recyclables. This money can be invested in local projects, selected by the community.

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